(19) World Intellectual Property Organization International Bureau





(43) International Publication Date 5 January 2006 (05.01.2006)

(10) International Publication Number WO 2006/001827 A3

- (51) International Patent Classification: *H01L 35/30* (2006.01) *H01L 35/08* (2006.01)
- (21) International Application Number:

PCT/US2004/040460

(22) International Filing Date:

2 December 2004 (02.12.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

 10/726,744
 2 December 2003 (02.12.2003)
 US

 10/727,062
 2 December 2003 (02.12.2003)
 US

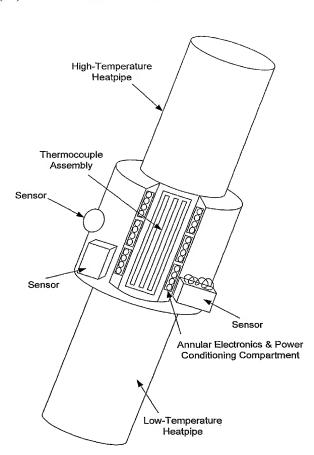
 60/558,298
 30 March 2004 (30.03.2004)
 US

(71) Applicant (for all designated States except US): BAT-TELLE MEMORIAL INSTITUTE [US/US]; 902 Battelle Boulevard, P.O. Box 999, Richland, WA 99352 (US). (72) Inventors; and

- (75) Inventors/Applicants (for US only): OLSEN, Larry, C. [US/US]; 490 Clermont Drive, Richland, WA 99352 (US). DESTEESE, John, G. [US/US]; 3323 West Canal Drive, Kennewick, WA 99336 (US). MARTIN, Peter, M. [US/US]; 7703 West 13th Avenue, Kennewick, WA 99338 (US). JOHNSTON, John, W. [US/US]; 111 Shadbolt, Yakima, WA 98908 (US). PETERS, Timothy, J. [US/US]; 1845 Alder Avenue, Richland, WA 99352 (US).
- (74) Agent: CALDWELL, Lisa, M.; Klarquist Sparkman, LLP, One World Trade Center, Suite 1600, 121 S.W. Salmon Street, Portland, OR 97204 (US).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,

[Continued on next page]

(54) Title: THERMOELECTRIC DEVICES AND APPLICATIONS FOR THE SAME



(57) Abstract: High performance thin film thermoelectric couples and methods of making the same are disclosed. Such couples allow fabrication of at least microwatt to watt-level power supply devices operating at voltages greater than one volt even when activated by only small temperature differences.

 $\label{eq:tn_transform} \text{TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.}$

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:

— of inventorship (Rule 4.17(iv))

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments
- (88) Date of publication of the international search report: 27 April 2006

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.